WSIP Executive Summary: The South Sacramento County Ag Program

A Model Multi-Benefit Project – Recycled Water, Groundwater Storage, Conjunctive Use and Ecosystem Enhancement on Southern Sacramento County

Program Summary

The South Sacramento County Agriculture & Habitat Lands Recycled Water, Groundwater Storage, and Conjunctive Use Program (South County Ag Program or Program) is an exceptional opportunity in Southern Sacramento County to proactively restore and manage groundwater, while improving stream flows in the lower Cosumnes River, enhancing groundwater-dependent riparian habitats and wetlands, sustaining prime agricultural lands, and improving regional water supply reliability. The Program would enhance water management in the southern Sacramento region by conjunctively managing surface and groundwater resources; using high quality recycled water for in-lieu and wintertime groundwater recharge, and using groundwater storage and banking to improve regional water supply reliability. The Program would also promote urban and agricultural cooperation, improve agricultural land viability, enhance water quality and ecosystem health within the Delta watershed, and support statewide water systems in proximity to the Delta.

The Program has the potential to provide up to 50,000 acre-feet per year (AFY) of Title 22 tertiary-treated recycled water produced by the Sacramento Regional County Sanitation District (Regional San) to irrigate up to 16,000 acres of agriculture and habitat lands in Sacramento County near the lower Cosumnes River and Stone Lakes National Wildlife Refuge (NWR). Since the Program would provide recycled water to existing agricultural lands that historically pump groundwater, it would reduce withdrawals of groundwater and allow groundwater levels in the Program area to recover. Additionally, the Program proposes to implement wintertime irrigation and wildlife-friendly recharge basins in the project area where the soils are suitable, to provide further groundwater recharge.

Not only is the South County Ag Program supported by a broad group of stakeholders (including The Nature Conservancy, Environmental Defense Fund, Clean Water Action, Trout Unlimited, the Farm Bureau, local water purveyors and Sacramento Central Groundwater Authority), but it also has an approved US Bureau of Reclamation Feasibility Study and a final Environmental Impact Report. The summary below demonstrates the impressive and extensive public ecosystem benefits of the Program.

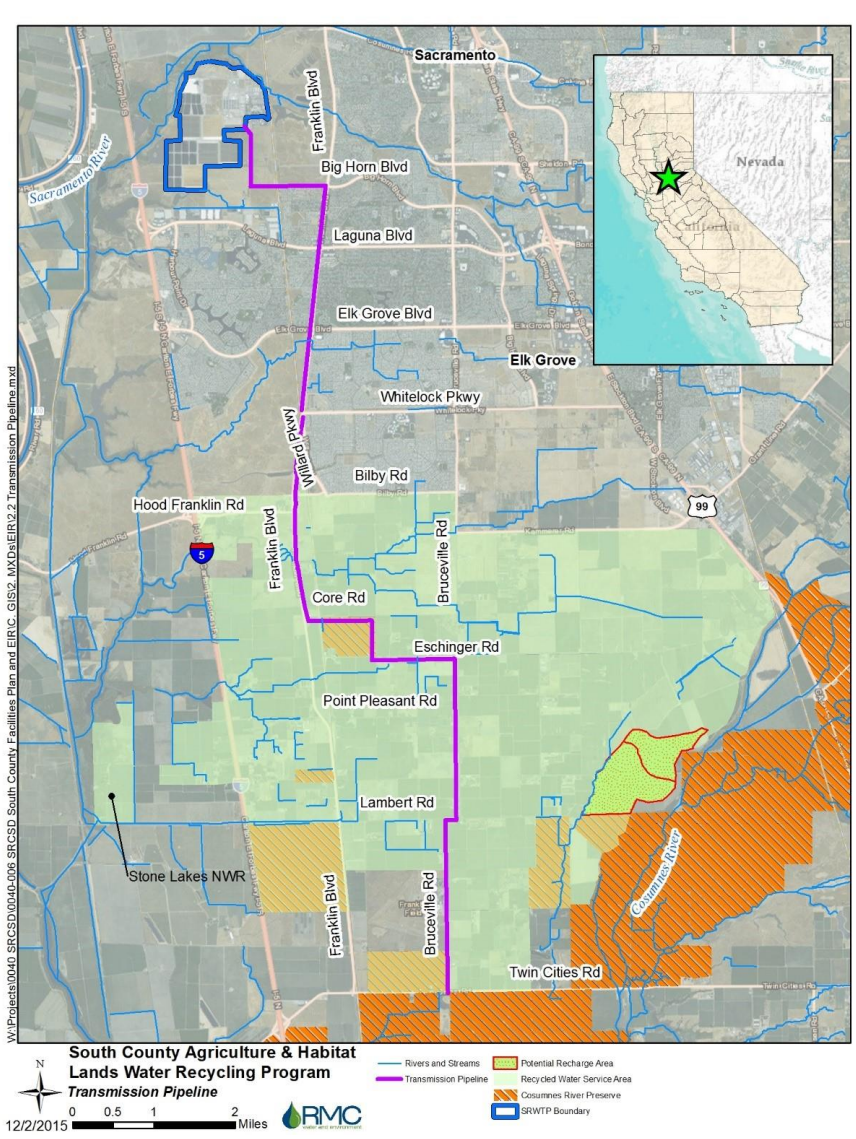
As modeled under 2030 climate change conditions, the South County Ag Program has a Public Benefit Ratio of 2.73 and provides the following benefits:

- Restores depleted groundwater levels up to 35 feet within 15 years.
- Increases groundwater storage capacity by 245,000 acre-feet within 10 years.
- Supports and increases riparian and wetland conditions on up to 4,933 acres.
- Increases additional habitat to support an additional 700 sandhill cranes.
- Restores 500 acres of vernal pool habitats.
- Increases frequency of Cosumnes River instream flows that exceed 10 cubic feet per second (cfs) by up to 16%.

- Increases the number of days that support fall-run Chinook salmon passage by 34% and increase the number of adult Chinook salmon by 143.
- Creates a groundwater banking system with up to 30,000 AFY available for conjunctive use during drought conditions.
- Reduces the mass loadings of salt to the lower Sacramento River and Delta by an average of 190,000 lbs/day (95 tons per day).
- Increases the number of visitors to the Cosumnes River Preserve and Stone Lakes National Wildlife Refuge.
- Facilitates urban and agricultural cooperation.
- Enhances groundwater surface water connectivity with other nearby restoration projects.

Program Facilities and Operations *(Per Section 6003(a)(1)(A)1.)*

The South County Ag Program is located within Southern Sacramento County, and includes portions of unincorporated Sacramento County, and portions of the Stone Lakes NWR. The Program area boundaries are Interstate 5 to the West, Highway 99 to the East, Bilby Road to the North, and Twin Cities Road to the South.



The Program proposes to use Title 22 tertiary-treated recycled water produced from Regional San's upgrade to the Wastewater Treatment Plant, known as the EchoWater project, for irrigating agricultural and habitat lands.

The recycled water will be supplied by constructing new recycled water transmission and distribution systems, as described in the Facilities Plan. The proposed facilities include a pump station, 14 miles of recycled water transmission pipelines and 25 miles of distribution mainlines and service laterals, a recharge area, appurtenant facilities, and existing raw water distribution infrastructure. The proposed pump station would be located within the Sacramento Regional Wastewater Treatment Plant (SRWTP) site. Transmission pipelines and distribution mains would be located on County and city streets and rural roads, primarily within public road rights-of-way (ROW), although distribution mains may also occur on private lands. The potential recharge area, diluent wells, and service connection laterals would generally be located on private agricultural lands or

dirt roads. Recycled water would be delivered to farms, wetlands, and, potentially, to a recharge area, all of which are currently outside Regional San's service area. It should be noted that the Program is only providing infrastructure to convey recycled water, not wastewater, and is designed to support the long-term viability of agricultural lands in the region as opposed to supporting development.

The average annual amount of recycled water delivered to participating irrigation customers and wildlife preserves at full program implementation would be up to 50,000 AFY. This amount includes 5,000 AFY for a potential direct winter irrigation recharge (wintertime recharge) area and 500 AFY delivered directly to Stone Lakes NWR. Recycled water would be delivered year-round to approximately 16,000 acres of irrigated farmlands for in-lieu use during the irrigation season and wintertime recharge during the non-irrigation season. This water would support direct recharge on up to 560 acres within the program footprint, as well as 400 acres of managed wetlands at Stone Lakes NWR during the spring and fall. The Program would be designed to provide two-thirds of the maximum monthly demand, which, on an annual basis, ranges between approximately 32,500 AFY and 37,000 AFY. During peak demand, the remaining irrigation needs exceeding the amount provided by the Program (approximately 9,200 AFY) would be met with existing private wells currently used for irrigation supply.

The fully implemented Program would include a groundwater bank, associated extraction wells and distribution system, and monitoring equipment. Where feasible, the Program would utilize the existing extraction wells and distribution system of future banking partners, with potential additional system upgrades to meet Program needs. Monitoring associated with the groundwater banking program would utilize both existing infrastructure and new Program monitoring wells in and near the Program area. Modeling under the 2030 climate change scenario indicates that the Program could increase groundwater storage capacity in the basin by approximately 245,000 AF within 10 years and 320,000 AF within 25 years. Withdrawals would only occur during periods with limited surface water resources, which, for modeling purposes, are estimated to occur 3 years out of 10 driest water years. Withdrawals would be based on the amount of available banked water (expected to be approximately 32,500 AFY based on initial modeling) and limited to a maximum of 50,000 AFY in those driest years, leaving approximately 70% or more of the banked water in storage to continue providing stream flow and riparian habitat benefits.

How the Added Quantity of Water From the Program Will Increase Water Reliability and Achieve Public Benefits *(Per Section 6003(a)(1)(A)4.)*

The South County Ag Program increases regional and state water supply reliability through groundwater storage and conjunctive use, while also achieving numerous public benefits. Both recycled water supply users (agricultural users) and potential groundwater banking partners will benefit from the Program's water supply reliability benefits. Through conjunctive use, a portion of stored groundwater could be withdrawn in dry years to meet a wide range of needs for a variety of regional water supply and reliability needs, including instream flow needs for fish, ecosystem viability, agricultural irrigation, municipal and industrial (M&I) uses, and other regional and Delta needs. Preliminary modeling suggests that the Program could increase groundwater storage in the basin by approximately 320,000 to 590,000 AF (with Program as compared to without Program, between approximately 25 years under 2030 climate conditions to 80 years under 2070 climate conditions, respectively). The volume actually stored will vary with banking operations on an annual basis, but preliminary plans are to withdraw in the driest three out of ten years, and approximately 30,000 AFY will be withdrawn in those years, leaving approximately 70% of the banked

water in the basin to assure the ecosystem benefits are realized. Groundwater extractions would be closely monitored to maintain the target groundwater levels in habitat areas.

This conjunctive use element would allow banking partners to limit their surface water diversions during times of drought and shift to groundwater pumping of the banked water. Those reductions in surface water diversions could potentially be sold to other entities for municipal or environmental uses, thereby improving water supply reliability in the Program area, as well as in the Delta and the State. The benefit of the banked water supply to the banking partners is conservatively estimated in the cost allocation and economic feasibility portions of the WSIP grant application, based on analysis initially conducted as part of the Feasibility Study. The Program is in the early stages of developing a groundwater bank and determining conjunctive use partners; therefore, the cost of providing this water beyond the banking partners cannot yet be determined.

The South County Ag Program is also designed to balance water resources reliability, with ecosystem enhancement and agricultural sustainability in the Sacramento region. The Program would stabilize and improve local groundwater conditions by increasing groundwater levels through a combination of in-lieu recharge of recycled water and conjunctive use. These modifications will ultimately reverse the groundwater flow direction back to the Cosumnes River, Snodgrass Slough, and Stone Lakes NWR, resulting in improved ecological health.

Specifically, the Program's improvement of groundwater and surface water connectivity will increase the reliability of surface water flows and promote the vitality of the local ecosystem, thereby protecting the aquatic and terrestrial habitat, as well as the species reliant on those areas in the immediate vicinity of the legal Delta. In addition, this connectivity will advance the goals and objectives identified in the NOAA Fisheries Recovery Plan for Sacramento River, State Wildlife Action Plan, Central Valley Joint Venture Implementation Plan, Recovery Plan for Giant Garter Snake, California Water Action Plan, and Delta Plan. The Delta Plan specifically identifies the Cosumnes and Mokelumne rivers confluence as a high priority conservation area and the Program's benefits are realized in these areas as well. Similarly, the in-lieu recharge will improve groundwater conditions and lessen pressure on surface waters in the Cosumnes, Mokelumne and Sacramento rivers, strengthening the water interconnection and furthering the water-related goals of the above plans.

Physical and Economic Magnitude of Public and Non-Public Benefits *(Per Section 6003(a)(1)(A)7.)*

Quantified and Monetized Public Benefits

Groundwater Restoration Benefits

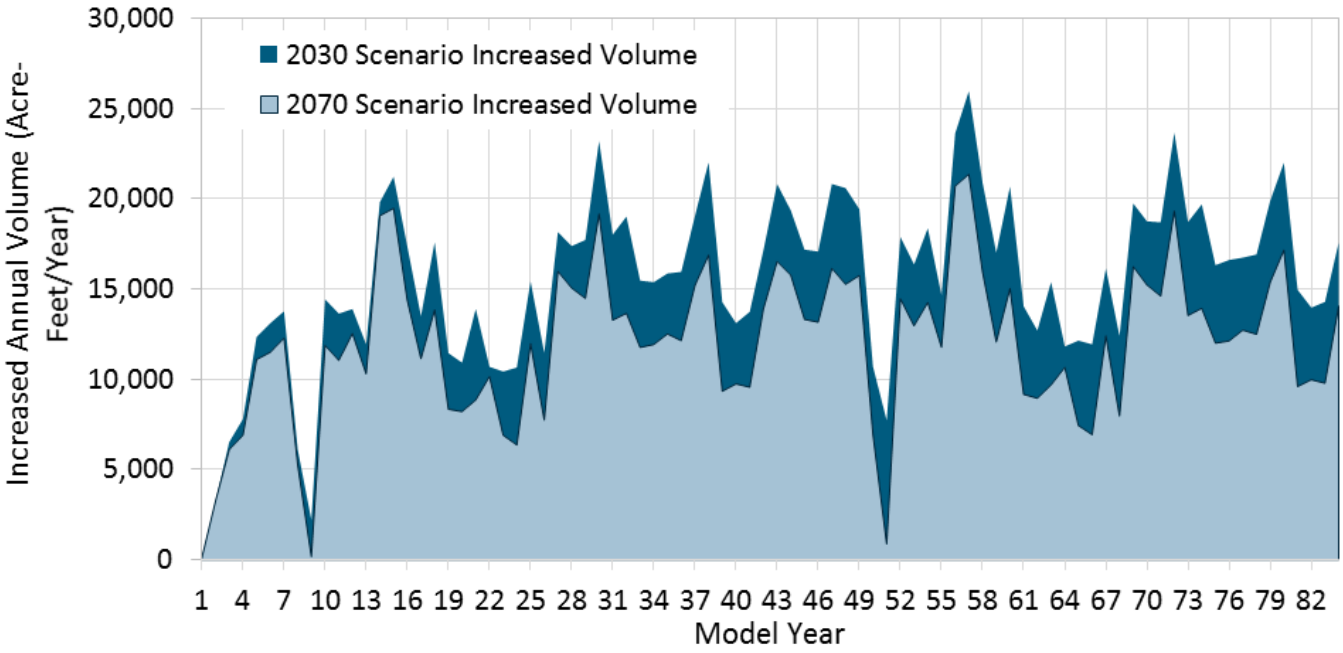
The recharge element of the Program is expected to raise groundwater levels up to 35 feet in the center of the Program area, and 20-30 feet in other parts of the South American groundwater subbasin - reversing a cone of depression that currently exists due to over-pumping of groundwater. Within 10 years, the program will increase groundwater storage capacity by 245,000 AF and within 25 years it will be increased by 320,000 AF.

Instream Flow Benefits

The lower Cosumnes river, a tributary to the Delta, currently runs dry for most of the summer and fall. These conditions have limited fish passage and have negatively impacted fall-run Chinook salmon. As the Program is implemented, it will stabilize groundwater levels, ultimately reversing the groundwater flow direction back to the Cosumnes River and Snodgrass Slough Complex, such that these rivers become gaining reaches (and reduce the number of days the river runs dry). Under the 2030 climate change scenario, the Program increases the frequency that the Cosumnes River base flows exceed 10 cfs by up to 16%. These improved base flows will not only benefit the returning Chinook salmon, but will also provide a habitat for the native resident fish and aquatic organisms in the lower Cosumnes River.

These benefits can also be articulated as a total flow volume improvement to the river, measured in AFY. Over the planning horizon, the improved flows in the Cosumnes River can be converted into a mean total water volume increase of approximately 15,500 AFY under the 2030 climate change scenario. The base flow improvements of the program will also benefit fall-run Chinook in the Cosumnes River by supporting a longer time period during the migration window where flow exceeds the minimum needed for passage. Under the 2030 climate change scenario, the Program is expected to increase the number of days that support fall-run Chinook passage by 34% and increase the number of adult Chinook salmon by 143.

The figure below illustrates the total annual increase in water volume (in AFY) in the Cosumnes River with the program in place under the 2030 and 2070 climate change scenarios for each modeling year.



Groundwater Dependent Ecosystem Benefits

The Cosumnes River ecosystem is one of the last remaining examples of an intact riparian forest ecosystem in California. This riparian and wetland vegetation is dependent on shallow groundwater to support mature vegetation and for seedling establishment. One of the important benefits of the Program is the increase in the shallow groundwater level, along with the increased frequency that the shallow groundwater is close enough to the ground surface to support the riparian ecosystem (ideally, this is

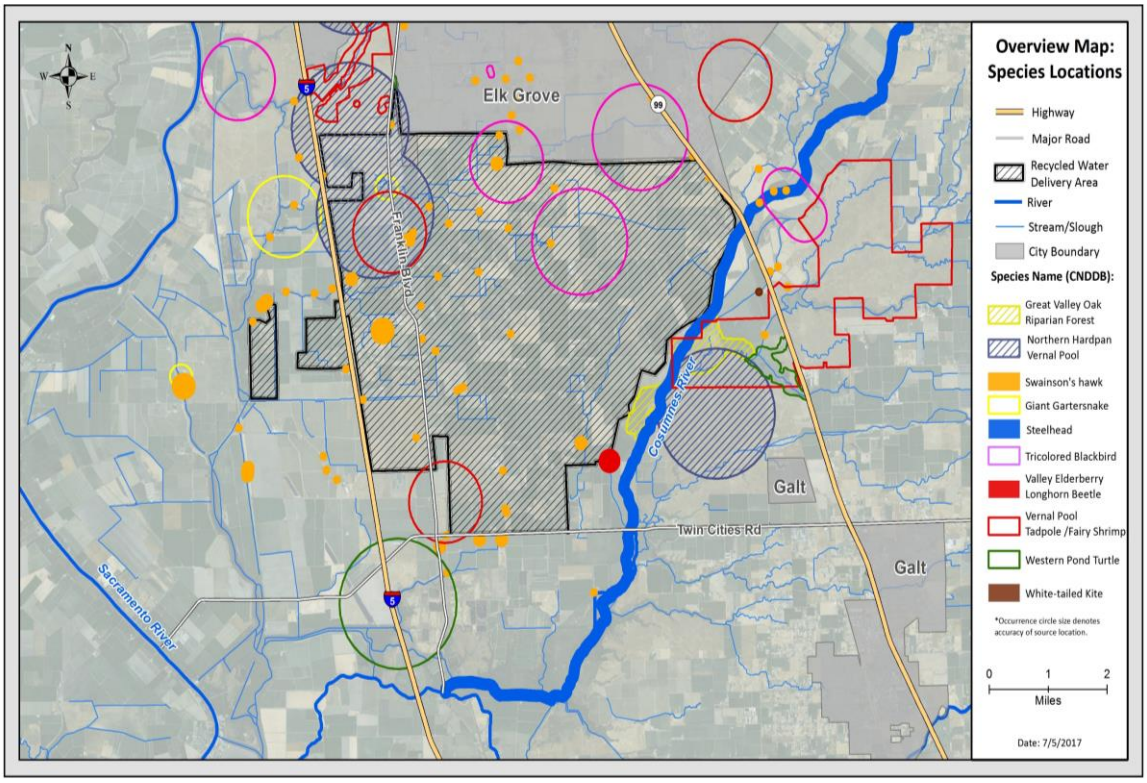
when groundwater levels are within 5 to 10 feet of the surface). Under the 2030 climate change scenario, the Program will facilitate shallow groundwater levels across an additional 3,133 acres of habitat that can support herbaceous and mature woody species.

Changes in Land Management to Support Wildlife

The presence of agriculture in the South County Ag Program area does not preclude the potential to support wildlife, but in fact, presents additional opportunities. An important aspect of the Program will be the collaboration with agricultural producers to receive recycled water for irrigation and to engage them in changes in land management practices to support wildlife. This complementary aspect of the Program will include a combination of targeted applications of water during the winter to flood agricultural fields along with changes in residue management. These actions would increase the overall habitat available within the Program area and adjacent and nearby wetlands, for many endangered, sensitive, and threatened species, including:

- California tiger salamander
- Chinook salmontscha
- Giant garter snake
- Greater sandhill crane
- Riparian brush rabbit
- Sacramento splittail
- Swainson's hawk
- Tricolored blackbird
- Valley elderberry longhorn beetle
- Vernal pool fairy shrimp
- Vernal pool tadpole shrimp
- Western pond turtle
- White-tailed kite
- Willow flycatcher
- Yellow warbler

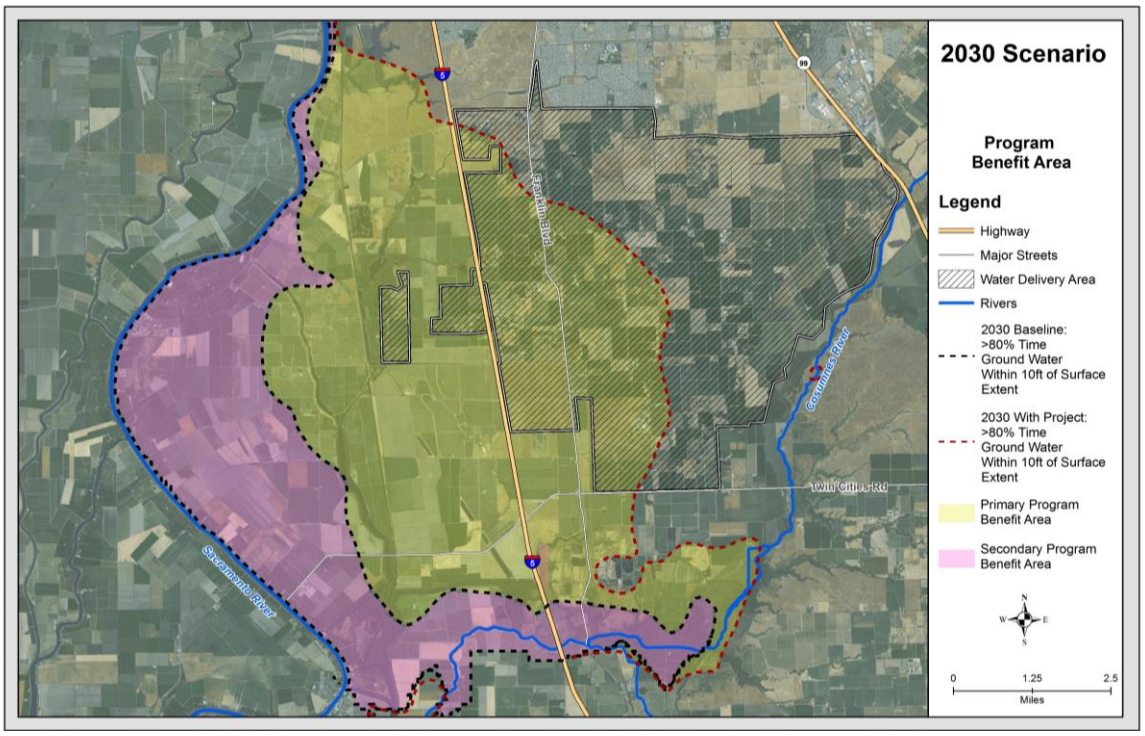
It is estimated the Program could increase the sandhill crane population by an additional 700 cranes in and around the Program area.



Conservation and Restoration of Vernal Pools

An estimated one-third of the remaining vernal pool habitat in Sacramento County has been eliminated as a result of recent development. As such, conservation and restoration of these unique habitats is a priority in the region. The South County Ag Program has the unique ability to tie in wide expanses of summer raptor foraging habitat, winter crane habitat, and vernal complexes in a single large, connected region. By integrating vernal pools and channels and their associated upland contributing watershed into the Program, the ecological values are maximized and overall management requirements are simplified as the land is managed for these values as a region, rather than being managed as a series of small parcels. As part of the South County Ag Program, 500 acres of vernal pool habitat will be targeted for restoration and conservation to improve habitat conditions. In addition to improved vernal pool habitats, securing strategic conservation easements in the Program area will help protect these valuable habitats from future conversion to crops within minimal habitat value, such as grapes.

This figure illustrates how the South County Ag Program generates ecosystem benefits from improved groundwater levels well beyond the Program area, by improving habitat connectivity to adjacent agricultural and conservation lands. The primary Program benefit (yellow) represents the area with the greatest projected ecological change as a result of the Program. The secondary Program benefit of the area (pink) represents the additional benefits of lesser magnitude that are realized.



Conservation and Restoration of Wetlands

The final ecosystem benefit of the Program involves a combination of two strategies designed to benefit wetlands: targeting site-specific winter water application of recycled water and invasive weed management. These wetland areas are not included in the benefit analysis associated with increased groundwater levels. Rather, benefits are realized from the delivery of recycled water for winter flooding to existing wetlands, which can then mitigate the risk of reduced function resulting from disconnection of wetland plants and soils from the groundwater table. There are approximately 1,500 acres and 1,000 acres of potential wetlands appropriate for water delivery on managed and unmanaged lands, respectively. Wetlands currently managed by The Nature Conservancy or other agencies, including those within the Cosumnes River Preserve and the Stone Lakes NWR, can likely be improved through recycled

water delivery and weed management. Unmanaged wetland areas can benefit as well, and are likely to produce an even a larger potential for improvement.

To implement this aspect of the South County Ag Program, landowners with acreage that can be reliably maintained in suitable condition would be targeted for long-term agreements, and adjacent properties with similar values would be secured using shorter-term agreements. The Program targets delivering recycled water for wintertime flooding on 1,000 acres of managed wetlands and 300 acres of unmanaged wetlands.

Water Quality Benefits

Four of eight Delta Waterways are listed as impaired for electro-conductivity as documented on the most recent Clean Water Act Section 305(b) and 303(d) Integrated Report for the Central Valley Region. In addition, the Bay-Delta Plan and the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins also regulate salinity levels in the receiving waters (Sacramento River and Delta). The proposed Program will reduce future effluent discharged to the lower Sacramento River near the town of Freeport. As a result, the mass loading of Total Dissolved Solids, a measure of salinity, to the lower Sacramento River will be reduced by approximately 190,000 lbs/day (95 tons per day). This will also slightly improve electro-conductivity levels in the lower Sacramento River downstream of the discharge and into the Sacramento-San Joaquin Delta.

Recreation Benefits

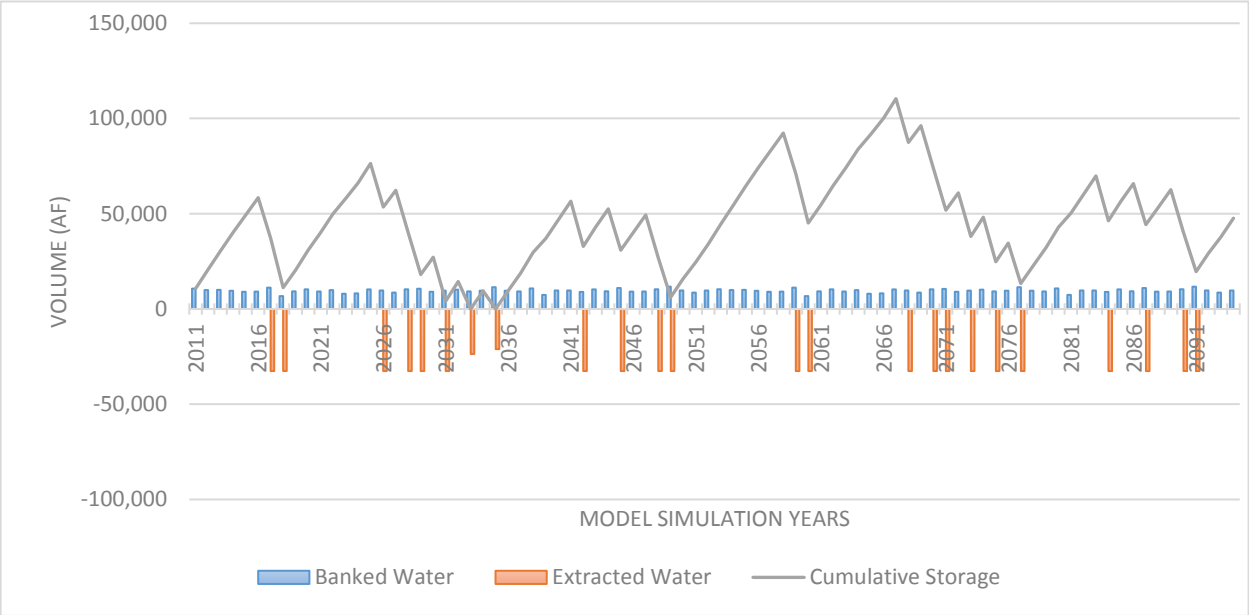
By providing high quality recycled water to the Stone Lakes NWR, the Program would support the overall health of the NWR and the public's ability to recreate there. The NWR offers a variety of recreation activities including self-guided nature walks, wildlife observation guided walks, wildlife observation paddle tours, environmental education and waterfowl hunting.

The Cosumnes River Preserve, adjacent to the southern boundary of the Program area, has approximately 70,000 visitors annually. The Preserve supports similar recreational activities as the Refuge. Our monetization of recreational benefits were based on the Cosumnes River Preserve and linked to the fall increase in stream flow, bringing more visitors at that time of the year.

Quantified and Monetized Non-Public Benefits

The South County Ag Program's non-Public benefits include water supply reliability, avoided fertilizer costs and avoided discharge costs. The Program would benefit individual groundwater banking partners by providing access a more reliable water supply during dry years. Specifically, the Program's conjunctive use element would allow banking partners to limit their surface water diversions during times of drought and shift to groundwater pumping of the banked water. Those reductions in surface water diversions could potentially be sold to other entities for municipal or environmental uses, improving water supply reliability in the Program area, as well as in the Delta and the State. The benefit of the banked water supply to the banking partners is conservatively estimated in the cost allocation and economic feasibility portions of the WSIP grant application, based on analysis initially conducted as part of the Feasibility Study. Approximately 70% of recharged water is assumed to be unavailable for extraction, as it is intended to benefit ecosystems and contribute to overall basin sustainability. The remaining 30% of recharged water is available for extraction during drought conditions. It is assumed that approximately 32,500 AFY would be available for extraction during dry years, when banked water is available. The extraction is ceased when the "banked"

water reaches zero to avoid extracting more than 30% of recharged water. Modeling results for extraction availability and effects under 2030 and 2070 climate change conditions are shown below.



The Figure above illustrates the Accounting of Banking and Extraction, and Cumulative Stored Water under 2030 Climate Change Conditions

The Program also provides benefits by avoiding existing costs. For agricultural users, these avoided existing costs are in the form of fertilizer use. The recycled water delivered in-lieu of groundwater pumping would have higher nitrogen concentrations and would allow for a commensurate reduction in nitrogen-based fertilizer application to crops. Under the Program, Regional San would benefit from the reduction of costs associated with the current practice of pumping and discharging 50,000 AF of recycled water each year to the Sacramento River. For more information on the monetization of non-public benefits see "Regional San Monetized Benefits A.3 Monetization Methods Non-Public Benefits" attached in Benefits Calculation, Resiliency, and Monetization tab, A.3.

Summary of the ecosystem benefits from the South County Ag Program under the 2030 and 2070 climate change scenarios. Present Value of Costs and Benefits Expressed in 2015 dollars. Costs include upfront Capital and Annual Costs over 84 year Operating Period.

Ecosystem Benefit	q	2030 Climate Change Scenario	2070 Climate Change Scenario	2030 Monetized Benefits	Project Costs	Unit for Monetization
Program Benefits from Management & Restoration						
Increased flows and migration window in Cosumnes River for fall-run Chinook	N/A (Instream Benefit)	143 adults Increased Flow of 15,511 AFY	95 adults Increased Flow of 11,987 AFY	$69,384,434	-	Additional adult salmon supported
Habitat management for greater sandhill cranes	Agricultural fields (row crops)	3,500 acres 700 cranes (project target)	3,500 acres 700 cranes (project target)	$179,558,434	-	Increased acres of habitat and number of cranes supported
Vernal pool restoration/ re-establishment (acres)	Agricultural fields (with potential for vernal pools)	500 acres (project target)	500 acres (project target)	$10,457,252	-	Increased acres of habitat
Groundwater-supported wetland & riparian forest restoration (acres)	Wetland forests	500 acres (10 miles) (project target)	500 acres (10 miles) (project target)	$31,023,586	-	Acres with 95% function
Water delivery-supported wetland restoration (acres)	Managed and Unmanaged wetlands	1,300 acres (project target)	1,300 acres (project target)	$113,072,360	-	Acres with functional improvements
Water Quality	N/A	95 tons/day reduced salt loading	95 tons/day reduced salt loading	$589,408,938	-	Cost of Reverse Osmosis to achieve salinity reduction
Recreation	N/A	Increased Visitors	Increased Visitors	$9,485,088	-	Increased fall flow & visitors
Benefit to Cost Ratio of 2.73		NPV Benefits and Cost		$1,019,737,770	$373,119,101	

Other Non-Monetized Public Benefits

The benefits of the South County Ag Program will extend far beyond the monetized values for the public benefits. The program combines improved water management with changes in land management for wildlife and habitat restoration, creating a holistic program that addresses a multitude of complex challenges. Combined, these benefits will not only enhance conditions within the region, but will improve the region's resiliency to the impacts of climate change.

Climate Change

One important benefit of the South County Ag Program will be the improved climate change resiliency for the entire area, including the area currently managed for conservation. The results of the climate change modeling highlight the extensive negative impact climate changes will have on the currently high-quality ecosystems in the Program area. Over the past few decades, many millions of both public and private dollars have been invested in the region to improve ecological conditions. This work has resulted in significant ecosystem improvements that are at risk of degradation, or being lost altogether, in the face of climate change. Under the baseline conditions, the continued decline in groundwater levels will occur under both climate change scenarios, resulting in fewer acres capable of sustaining riparian or wetland vegetation. Without the program in place, the declining groundwater elevations will severely impair the ecological function of these conserved and restored habitats. As such, an additional benefit of the Program will be the continued support of these managed ecosystems, protecting the extensive resources that have been invested in the region against the impacts of climate change.

Habitat Connectivity

The Program will provide ecosystem improvements in several areas that overlap with or are in close proximity to areas already being managed for conservation benefits. The Stone Lakes NWR is partially within and partially adjacent to the project area. Similarly, the Cosumnes River Preserve and conservation lands owned by The Nature Conservancy are within and adjacent to the project area. There is a direct hydrologic connection amongst a majority of these lands, and the ecological benefits of the Program accrue across many acres of important conserved lands. For instance, in the 2030 and 2070 climate projections for the Program area, over half of the wetlands with shallow groundwater (within five feet of the surface) are owned by public or private entities and managed for conservation purposes. Similarly, the increased groundwater storage will remedy the existing groundwater overdraft, returning this area into one that feeds the Cosumnes River, as opposed to its current state of drawing water off of the river. Thus, the hydrologic and environmental benefits will accrue to areas currently managed for conservation, ensuring that those areas continue to achieve their intended purpose in spite of the additional stress imposed by climate change.

Preserving working farmlands

The preservation of farmland with annual crops surrounding the Cosumnes River Preserve is an important element of the Preserve's long-term strategy. In addition to being significant to the region's economic wellbeing, to the strategy supports a number of key target species of the Cosumnes River Preserve, such as Swainson's hawk. Exploring voluntary arrangements with farmers, along with complementary incentives to preserve prime agricultural lands within the Program area, could help encourage wildlife-friendly farming practices. In this way the Program can also support regional planning efforts, such as the

American River Basin Integrated Regional Water Management Plan and the Sacramento Area Council of Governments' 2008 Rural-Urban Connections Strategies. The cost of preserving working farmlands is unpredictable, as the changing patterns of agricultural landscapes are mostly driven by economic considerations of the farmer.

Improving groundwater dependent ecosystem science
UC Davis and The Nature Conservancy are conducting a combined extensive research and groundwater-monitoring program for understanding groundwater dependent ecosystems at the Cosumnes River Preserve. This research program provides an unparalleled opportunity to improve the science of determining what levels of groundwater recharge are most beneficial for a riparian forest. The information gained from the South County Ag Program's monitoring efforts will contribute to the research efforts of UC Davis and The Nature Conservancy. Results of these collaborative efforts can then help guide long-term adaptive management of the Program, particularly in potential future groundwater banking scenarios. Studies will also inform development of broader Sustainable Groundwater Management Act (SGMA)-related groundwater dependent ecosystem standards for beneficial uses, thresholds and desirable results. This cost cannot be monetized because there have not been any studies to say how much this research is worth, specifically in relation to groundwater-dependent ecosystems.

Emergency Response
The infrastructure that will be put in place to deliver recycled wastewater to agricultural fields and wetlands in the Program area will have the ancillary benefit of making water available to the Cosumnes Fire Department. The fire department needs additional water to support its operations outside of the municipal areas, and for the municipal areas that are served by lower capacity wells and tanks. As a result, the availability of water to emergency responders is likely to be highly valuable in terms of human health and property in rural communities within and near the Program area.

Program Flexibility and Integration with One or More State Water Systems *(Per Sections 6003(a)(1)(A)2. and 6003(a)(1)(A)3.)*

The South County Ag Program benefits the overall long-term sustainability of local and regional water resources through improved groundwater and surface water conditions in and around the Program area as a result of in-lieu and wintertime groundwater recharge operations. The Program would add greater flexibility to the management of the local groundwater and surface water resources conjunctively and contribute to the improved management of water resources at the regional and statewide level. The Program would also benefit the broader Central Valley water system, including the State Water Project, Central Valley Project and the Sacramento-San Joaquin Delta through increased streamflow in the lower Cosumnes River and Mokelumne River, both of which are Delta tributaries. These increases in streamflow would be a result of increased groundwater elevations near the Program area.

Regional San is a member of both the Sacramento Regional Water Authority and the Sacramento Central Groundwater Authority. Each organization has a broad consortium of urban and rural water interests that include the City of Sacramento and Sacramento County Water Agency, in addition to Regional San. Both authorities help protect and enhance surface and groundwater supply reliability for the Sacramento Region. The Sacramento Regional Water Authority, in partnership with its member agencies, has developed an Integrated Regional Water Management Plan (IRWMP) to identify regional projects and partnerships that will help the region best meet its future water resources needs. The South County Ag Program has been identified as a high-priority project in the IRWMP to help improve the region's water supply reliability.

Since the Program proposes to establish a groundwater banking system that would provide approximately 30,000 AFY of water available for conjunctive use during droughts, there has been ongoing dialogue with urban and agricultural water supply interests. The expected groundwater banking partner(s) include the Sacramento Central Groundwater Authority and its members. This conjunctive use element of the Program will allow banking partners to limit their surface water diversions during times of drought and shift to groundwater pumping of the banked water. The Program proposes to use existing extraction wells and distribution systems of future banking partners. These reductions in surface water diversions could potentially be sold to other entities for municipal or environmental uses, improving water supply reliability in the region and state. Although no final agreements have been reached with these agencies, the proposed project banking and recharge operations are consistent with the conjunctive use plans of these agencies.

The Program has also coordinated efforts with the US Bureau of Reclamation (Bureau) and has a completed Feasibility Study that has been approved and accepted by the Bureau. The Program is currently listed as an authorized project under Title XVI and the Bureau has determined the Program's Feasibility Study meets the requirements contained in the Reclamation Manual Directives and Standards WTR-11-01 for Title XVI feasibility studies. The Program has recently been included in a list of Title XVI eligible projects that was transmitted to Congress on July 12, 2017.

Additional details on the Program's facilities, operations, and integration with other water systems can be found in the various technical documents included with the WSIP application.

Program's Ability to Contribute to Sustainable Groundwater Management *(Per Section 6003(a)(1)(A)5.)*

The South County Ag Program is located within the Sacramento Valley groundwater basin, South American subbasin. The South American subbasin is classified as a high priority basin by the California Department of Water Resources. (SGMA) requires Groundwater Sustainability Agencies (GSA) to be formed in medium- and high-priority basins to create and implement Groundwater Sustainability Plans for achieving sustainable groundwater management. The Sacramento Central Groundwater Authority formed as a GSA in July 2016 and has a 16-member board that represents all groundwater users and stakeholders in the South American subbasin. Regional San has been a board member since the Sacramento Central Groundwater Authority's inception in 2006.

The Program directly benefits the groundwater of the South American subbasin and, to a lesser extent, the Cosumnes subbasin immediately south of the Cosumnes River. Modeling results under the 2030 climate change scenario show both an increase in groundwater storage and groundwater levels. In the first 15 years of simulation, assuming full implementation in year one, groundwater elevations increase by up to 35 feet near the center of the project area, filling in an area of groundwater depression. The modeling also suggests that within 20 years, the Program could increase groundwater storage in the basin by approximately 290,000 AF. Ultimately, as equilibrium is reached where hydraulic interconnectedness between groundwater and surface water occurs, modeling shows that groundwater storage levels out and fluctuates based on hydraulic conditions, averaging an increase in groundwater storage capacity of approximately 450,000 AF.

The Sacramento Central Groundwater Authority is the primary GSA where the Program is located. As a Sacramento Central Groundwater Authority board member, Regional San is integral to establishing a

Groundwater Accounting Program that will lay a foundation for groundwater banking as it relates to the Program and establishing groundwater banking principles for conjunctive use. Regional San has presented information on the proposed Program to the Sacramento Central Groundwater Authority Board, most recently in July 2017. Sacramento Central Groundwater Authority has submitted a letter of support for the Program noting that the Program contributes to the resiliency of the groundwater basin and SGMA compliance.

Program's Ability to Expand Beyond Its Current Capacity, Including Any Planned Phases (*Per Section 6003(a)(1)(A)6.)*

Additional opportunities may exist to expand the use of recycled water. Potential expansion of the in lieu recharge program, which results in groundwater storage, conjunctive use and the associated public and non-public benefits, could be possible, but would require a new source of water (e.g., additional recycled water). It would also require, new infrastructure to convey that water to recharge locations and potentially new infrastructure for direct recharge (injection wells). In terms of the direction of expansion, Regional San has been approached by advocates for restoration of the Cosumnes River about extending the water supply upstream through recycled water extensions and exchanges for surface water which could be released upstream (perhaps from the Folsom South Canal) for channel pre-wetting in the Fall and for recharge in the stream channel.

Another approach for expansion of the benefits would be to consider water demand management in the agricultural sector. There could be opportunities through water use efficiency for irrigated agriculture at very reasonable cost, and significant efficiency benefits that could also increase groundwater supply.

Program Resiliency

Operational Drought Resiliency

The proposed recharge program is unique in that it has a consistent and reliable amount of water available for recharge because the tertiary treated water is produced daily. That continuous supply creates resiliency because water managers do not have to make complex predictions of precipitation patterns and flood control requirements, pay for costly transfers, or be subject to competing environmental demands. The improvements to groundwater storage, groundwater levels and streamflow with the Program recharge operations can benefit the region as it faces future droughts, challenges with uncertainties of climate change or other extreme events. The benefits to the underlying groundwater basin and neighboring basins achieved by the Program recharge operations can become a critical dry year supply when the surface water supplies become limited and dependence on groundwater increases. The improved groundwater and surface water conditions with the Program can help the region mitigate the negative impacts on water resources and recover from impacts sooner. In addition, during dry periods, extraction of the banked water can provide critical dry year supplies to a variety of users and allow surface water diversions to be reduced, benefiting the state water system, specifically in the Sacramento region and Delta. This operational flexibility means that a variety of groundwater management programs could function even under sustained droughts to still achieve the project benefits.

Ecosystem Resiliency

Under the modeled 2030 and 2070 climate change conditions, the groundwater improvements and surface water benefits from this Program provide resiliency from climate change impacts not only to the Program area, but also to nearby existing private and public investments which have been implemented in the watershed. This, in addition to the proposed Program benefits outlined in the Ecological Plan, will occur in the following two ways: (1) reversing the groundwater-stream gradient from losing to gaining, stabilizing and improving the ecological resilience under today's climate; and (2) most importantly, ensuring existing public conservation lands in the area are preserved as climate change continues. For instance, without the Program, baseline conditions in 2030 and 2070 show that the groundwater conditions would not support healthy ecosystems in any of the existing public conservation lands in the area.

Stakeholder Engagement and Support

A key ongoing component during Program planning, construction and implementation will be collaboration with agricultural users, water suppliers and environmental interests. Because the core feature of the Program is the provision of a reliable, drought-proof supply of recycled water for agricultural irrigation, Regional San has been working with the Agricultural community and the local Farm Bureau for several years, holding briefings to inform and receive feedback from local farmers about the Program. Discussion topics have included the quality of recycled water and location of distribution lines and extraction systems. Letters of Interest have been received from 29 landowners representing approximately 9,472 acres in the Program area, and an advisory committee comprised of local agricultural interests has also been formed to provide feedback on future governance, principles of agreement and potential contract terms.

Environmental interests have also been extensively engaged to help shape the Program, and have provided input on how to maximize ecosystem benefits and ensure they are realized. In 2013, the Sacramento Water Recycling Coalition was formed, which includes a variety of local environmental interests, to receive early input on the Program. Regional San has also partnered with The Nature Conservancy, conducting early modeling analyses to help broaden the Program's scope for enhancing ecosystem benefits. In early 2016, Regional San and The Nature Conservancy submitted a joint concept paper to the California Water Commission highlighting the potential benefits of the South County Ag Program. Additional environmental interests have also supported the Program as highlighted below. In addition, the Coalition to Support Delta Projects identified the South County Ag Program as a near-term Delta Project that should be supported and was worthwhile to move through regulatory processes. This Coalition was comprised of a group of over 80 diverse stakeholders, including environmental interests, water exporters (including Metropolitan Water District and Westlands Water District), Delta residents and others.

Working with water suppliers to develop an effective conjunctive use program helps ensure water supply reliability for the region, without compromising the Program's environmental benefits. This conjunctive use element would allow banking partners to limit their surface water diversions during times of drought and shift to groundwater pumping of the banked water. Ongoing discussions with the Sacramento Central Groundwater Authority and its members will be critical to further refine the Program's recharge and extraction operations and to develop a groundwater accounting framework and banking system. These agencies have also provided letters of support for the Program.

The continued engagement with these groups, as well as with the Department of Water Resources, Department of Fish & Wildlife, State and Regional Water Boards and other stakeholders, will help guide the development, monitoring and adaptive management of the Program. Below we have listed all of the groups who have submitted letters of support for the program to receive WSIP funding. These support letters along with an example Letter of Interest and Draft Principles of Agreement have been included in "A.6 Other Application Information" under the GRANTS Eligibility and General Project Information Tab.

- ✓ The Nature Conservancy
- ✓ Environmental Defense Fund
- ✓ Trout Unlimited
- ✓ Clean Water Action
- ✓ American Rivers
- ✓ American River Conservancy
- ✓ Cosumnes Coalition
- ✓ Sacramento County Farm Bureau
- ✓ Stone Lakes National Wildlife Refuge
- ✓ Sacramento Area Creeks Council
- ✓ Sacramento County Water Agency
- ✓ The Sacramento Central Groundwater Authority
- ✓ Congresswoman Matsui (CA-6)
- ✓ Congressman Bera (CA-7)
- ✓ CA Assembly Member Kiley (AD-6)
- ✓ CA Assembly Member McCarty (AD-7)
- ✓ CA Assembly Member Cooley (AD-8)
- ✓ CA Assembly Member Cooper (AD-9)
- ✓ CA Senator Gaines (SD-1)
- ✓ CA Senator Pan (SD-6)

Sacramento Central Groundwater Authority

Regional San and Environmental Stewardship

Regional San and its 1.4 million customers are also beneficiaries of the Program. One of Regional San's core values is environmental stewardship. Beyond the job of protecting public health through the treatment of wastewater, Regional San engages in sustainability programs that lessen its environmental footprint from its operations, such as increasing water reuse. This Program allows Regional San to maximize the use of its recycled water to meet its goal of recycling 30 to 40 million gallons per day of its treated wastewater by 2025. The Program also helps Regional San and its customers promote environmental stewardship by putting its highly treated wastewater to a new beneficial use, diversifying its discharge portfolio and managing its water asset strategically. The South County Ag Program's various groundwater and ecosystem benefits help Regional San move toward accomplishing its goal of environmental sustainability and resource recovery.

Conclusion

The South County Ag Program would provide a broad array of environmental and water supply benefits to the Sacramento region, the Delta, and the state of California. By restoring groundwater levels, this innovative project will improve stream flows in the lower Cosumnes River (a Delta tributary) and enhance habitat values in groundwater-dependent riparian forests and wetlands. The Program would provide equally important water supply reliability benefits by conjunctively managing surface and groundwater resources; using high quality recycled water for in-lieu and wintertime groundwater recharge and using groundwater storage and banking system to ensure groundwater is available for agricultural water users during dry times. And, with a unit cost of $270 per acre-foot, the Program is much more cost effective than most other pending water storage projects in California.

In addition to providing the multiple benefits outlined above, this project would be a landmark example of a more holistic approach to managing water resources for the benefit of the environment, agriculture and local communities. This type of project and approach to water management will be essential if California is to fully implement SGMA, particularly in the face of climate change and a growing population.

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WSIP Executive Summary: Compiled Measurements from Document

Program Goals and Changes and Associated Acre-Feet Measurements

Program Goal or Proposed Change	Amount (measured in AF or AFY)
Regional San to provide tertiary-treated recycled water	• Up to 50,000 AFY
Groundwater banking system to provide water for conjunctive use during drought conditions	• Up to 32,500 AFY
Recycled water to be delivered to irrigation customers and wildlife preserves	• 50,000 AFY (at full implementation), including ○ 32,500 AFY for irrigation (average) ○ 17,000 AFY for wintertime recharge ○ 500 AFY to Stone Lakes NWR
Provisions to meet two-thirds of maximum monthly demand	• Two-thirds of demand: from an average of 32,500 AFY to 37,000 AFY in years with greater ETO years
Limits to be imposed on both timing and amount of withdrawals	• Estimated average of 32,500 AFY in withdrawals • Maximum of 50,000 AFY in withdrawals during driest years • Withdrawals in driest 3 of 10 years: approximately 30,000 AFY
Increased groundwater storage in the basin	• Increase of 245,000 AF after 10 years (2030 climate conditions) • Increase of 320,000 AF after 25 years (2030 climate conditions) • Increase of 590,000 AF after 80 years (2070 climate conditions)
Improved flows in the Cosumnes River and resulting water volume increase	• 15,000 AFY under 2030 climate conditions

References:

Ascent Environmental. 2014. *Draft Environmental Impact Report for the Sacramento Regional County Sanitation District EchoWater Project.* March. https://www.regionalsan.com/post/echowater-final-environmental-impact-report-feir

California Water Commission (CWC). 2016. *Water Storage Investment Program Technical Reference.* November.

*CH2M. 2017. *Development of WSIP Climate Scenarios for use in HEC5Q*. August. GRANTS Benefit Calculation, Monetization, and Resiliency tab, A.1 Project Condition. File; "Regional San_ClimateScenariosForHEC5Q_TM_A.1_ProjectConditions_SecBCMR.pdf"

*CH2M. 2017. *South County Ag Program WSIP Application Surface Water Operations and Temperature Modeling*. August. GRANTS Benefit Calculation, Monetization, and Resiliency tab, A.1 Project Condition. File; "Regional San_CALSIM_HEC5Q_ModelingTM_A.1ProjectConditions_SecBCMR.pdf"

*Larry Walker Associates. 2017. *Far-Field Water Quality Analysis and Benefit Monetization in Support of WSIP Application for South County Ag Program*. August. GRANTS Physical Public Benefits tab, A.2 Water Quality Benefits Supporting Documents. File: "Regional San_WQ Salinity TM_A.1 WQ Benefit-Quantification_SecPPB.pdf"

**RMC Water and Environment. 2014. *Sacramento Regional County Sanitation District South County Recycled Water Feasibility Study.* May. https://www.regionalsan.com/general-information/south-county-ag-feasibility-study

**RMC Water and Environment. 2015. *South Sacramento County Agricultural & Habitat Lands Recycled Water Program Facilities Plan, Draft.* August. Updated June 2017. GRANTS Eligibility and General Project Information tab, A.4 Project Description Support. File: "Regional San_Facilities Plan_Vol1_Report_A.4_Project Description Support_SecEGPI.pdf"

RMC Water and Environment. 2016. *Sacramento Regional County Sanitation District's South Sacramento County Agriculture and Habitat Lands Recycled Water Program Draft Environmental Impact Report (SCH#: 2015022067).* July. https://www.regionalsan.com/post/south-county-ag-final-environmental-impact-report

*RMC Water and Environment. 2017. *Integrated Groundwater and Surface Water Modeling Results Technical Memorandum*. August. GRANTS Benefit Calculation, Monetization, and Resiliency tab, A.1 Project Condition. File; "Regional San_SacIWRM ModelingTM_A.1Project Conditions_SecBCMR.pdf"

*The Freshwater Trust. 2017. *Conceptual Ecological Plan & Ecosystem Benefits*. August. GRANTS Physical Public Benefits tab, A.1 Ecosystem Benefits. File: "Region San EcoPlan_A.1 EcoBenefits_SecPPB .pdf"

Western Regional Climate Center (WRCC). 2017. *Monthly Average Pan Evaporation*. Lodi, California Station. Data available online: https://wrcc.dri.edu/htmlfiles/westevap.final.html. Accessed July 21, 2017.

*Available as attachment to this grant application under the Benefits Calculation, Monetization, and Resiliency Tab
**Available as attachment to this grant application under the Feasibility and Implementation Risk Tab